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SEQUENCE LISTING

<110> Dalemans, Wilfried L.J.
Gerard, Catherine Marie Ghislaine

<120> Vaccine

<130> B45124

<140> 09/581,976

<141> 2000-06-20

<150> PCT/EP98/08563

<151> 1998-12-18

<150> GB 9727262.9

<151> 1997-12-24

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<212> PRT

<213> Artificial Sequence

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<223> Chimaeric protein (protein D from Haemophilus
influenza B and E7 from Human papilloma virus type
16)

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Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
20 25 30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
35 40 45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
50 55 60

SH
cont'd.

Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
 65 70 75 80
 Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
 85 90 95
 Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
 100 105 110
 Ala Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu
 115 120 125
 Gln Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser
 130 135 140
 Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro
 145 150 155 160
 Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser
 165 170 175
 Thr Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu
 180 185 190
 Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser
 195 200 205
 Gln Lys Pro Thr Ser Gly His His His His His His
 210 215 220

<210> 2

<211> 663

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
 influenza B and E7 from Human papilloma virus type
 16)

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 cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180
 cgtttagtgg ttatttcacga tcacttttta gatggcttga ctgatgttgc gaaaaaatc 240
 ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt 300
 caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggaga tacacctaca 360
 ttgcatgaat atatgttaga ttgcaacc gagacaactg atctctactg ttatgagcaa 420
 ttaaattgaca gctcagagga ggaggatgaa atagatggtc cagctggaca agcagaaccg 480
 gacagagccc attacaatat tgtaacctt tgttgcaagt gtgactctac gcttcggttg 540
 tgcgtacaaa gcacacacgt agacattcgt actttggaag acctgttaat gggcacacta 600
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<223> Chimaeric protein (protein D from Haemophilus
influenza B and E6 from Human papilloma virus type
16)

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CTTGCGTTTG CACAACAGGC TGATTATTTA GAGCAAGATT TAGCAATGAC TAAGGATGGT 180
CGTTTAGTGG TTATTACGA TCACTTTTGA GATGGCTTGA CTGATGTTGC GAAAAAATTC 240
CCACATCGTC ATCGTAAAGA TGGCCGTTAC TATGTCATCG ACTTTACCTT AAAAGAAATT 300
CAAAGTTTAG AAATGACAGA AAACCTTGAA ACCATGGCCA TGTTTCAGGA CCCACAGGAG 360
CGACCCAGAA AGTTACCACA GTTATGCACA GAGCTGCAAA CAACTATACA TGATATAATA 420
TTAGAATGTG TGTACTGCAA GCAACAGTTA CTGCGACGTG AGGTATATGA CTTTGCTTTT 480
CGGGATTTAT GCATAGTATA TAGAGATGGG AATCCATATG CTGTATGTGA TAAATGTTTA 540
AAGTTTATT CTAAATTAG TGAGTATAGA GATTATTGTT ATAGTTTGTA TGGAACAACA 600
TTAGAACAGC AATACAACAA ACCGTTGTGT GATTTGTTAA TTAGGTGTAT TAACTGTCAA 660
AAGCCACTGT GTCCTGAAGA AAAGCAAAGA CATCTGGACA AAAAGCAAAG ATTCCATAAT 720
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<213> Artificial Sequence

<220>
<223> Chimaeric protein (protein D from Haemophilus
influenza B and E6 from Human papilloma virus type
16)

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 Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
 35 40 45
 Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
 50 55 60
 Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
 65 70 75 80
 Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
 85 90 95
 Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
 100 105 110
 Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu
 115 120 125
 Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val
 130 135 140
 Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe
 145 150 155 160
 Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys
 165 170 175
 Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr
 180 185 190
 Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro
 195 200 205
 Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys
 210 215 220
 Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn
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 260 265 270
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<210> 5

<211> 1116

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
 influenza B and E6E7, fusion from Human papilloma
 virus type 16)

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cgttttagtgg	ttattcacga	tcacttttta	gatggcttga	ctgatgttgc	gaaaaaatc	240
ccacatcgtc	atcgtaaaga	tggccgttac	tatgtcatcg	actttacctt	aaaagaaatt	300
caaagttag	aatgacaga	aaactttgaa	accatggcca	tgtttcagga	cccacaggag	360
cgaccagaa	agttaccaca	gttatgcaca	gagctgcaaa	caactataca	tgatataata	420
ttagaatgtg	tgtactgcaa	gcaacagtta	ctgcgacgtg	aggtatatga	ctttgctttt	480
cgggatttat	gcatagtata	tagagatggg	aatccatatg	ctgtatgtga	taaatgttta	540
aagttttatt	ctaaaattag	tgagtataga	cattattggt	atagtttgta	tggaacaaca	600
ttagaacagc	aatacaacaa	accgttgtgt	gatttggtta	ttaggtgtat	taactgtcaa	660
aagccactgt	gtcctgaaga	aaagcaaaga	catctggaca	aaaagcaaag	attccataat	720
ataaggggtc	ggtggaccgg	tcgatgtatg	tcttggtgca	gatcatcaag	aacacgtaga	780
gaaaccagc	tgatgcatgg	agatacacct	acattgcatg	aatatatgtt	agatttgcaa	840
ccagagacaa	ctgatctcta	ctgttatgag	caattaatg	acagctcaga	ggaggaggat	900
gaaatagatg	gtccagctgg	acaagcagaa	cgggaacagag	cccattacaa	tattgtaacc	960
ttttgttgca	agtgtgactc	tacgcttcgg	ttgtgcgtac	aaagcacaca	cgtagacatt	1020
cgtactttgg	aagacctgtt	aatgggcaca	ctaggaattg	tgtgccccat	ctgttctcag	1080
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<210> 6

<211> 371

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E6E7 fusion from Human papilloma
virus type 16)

<400> 6

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Ser	Asp	Lys	Ile	Ile	Ile	Ala	His	Arg	Gly	Ala	Ser	Gly	Tyr	Leu
			20					25					30	Pro
Glu	His	Thr	Leu	Glu	Ser	Lys	Ala	Leu	Ala	Phe	Ala	Gln	Gln	Ala
			35				40					45		Asp
Tyr	Leu	Glu	Gln	Asp	Leu	Ala	Met	Thr	Lys	Asp	Gly	Arg	Leu	Val
			50				55					60		Val
Ile	His	Asp	His	Phe	Leu	Asp	Gly	Leu	Thr	Asp	Val	Ala	Lys	Lys
65					70					75				80

Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
 85 90 95
 Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
 100 105 110
 Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu Pro Gln Leu
 115 120 125
 Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu Glu Cys Val
 130 135 140
 Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp Phe Ala Phe
 145 150 155 160
 Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr Ala Val Cys
 165 170 175
 Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr Arg His Tyr
 180 185 190
 Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr Asn Lys Pro
 195 200 205
 Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys Pro Leu Cys
 210 215 220
 Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg Phe His Asn
 225 230 235 240
 Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys Arg Ser Ser
 245 250 255
 Arg Thr Arg Arg Glu Thr Gln Leu Met His Gly Asp Thr Pro Thr Leu
 260 265 270
 His Glu Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Cys
 275 280 285
 Tyr Glu Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly
 290 295 300
 Pro Ala Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr
 305 310 315 320
 Phe Cys Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr
 325 330 335
 His Val Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly
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 355 360 365
 His His His
 370

<210> 7

<211> 663

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and mutated E7 from Human papilloma
virus type 16)

<400> 7

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cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180
cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaatc 240
ccacatcgtc atcgtaaaga tggcggttac tatgtcatcg actttacctt aaaagaaatt 300
caaagtttag aaatgacaga aaactttgaa accatgggca tgcattggaga tacacctaca 360
ttgcatgaat atatgttaga ttgcaacca gagacaaetg atctctacgg ttatcagcaa 420
ttaaatagaca gctcagagga ggaggatgaa atagatggtc cagctggaca agcagaaccg 480
gacagagccc attacaatat tgtaaccttt tgttgcaagt gtgactctac gcttcggttg 540
tgcgtaaaaa gcacacacgt agacattcgt actttggaag acctgttaat gggcacacta 600
ggaattgtgt gcccacatctg ttctcagaaa ccaactagtg gccaccatca ccatcaccat 660
taa 663
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41 <210> 8

<211> 220

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and mutated E7 from Human papilloma
virus type 16)

<400> 8

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Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
 1          5          10          15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
 20          25          30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
 35          40          45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
 50          55          60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
 65          70          75          80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
 85          90          95
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Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met
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Ala	Met	His	Gly	Asp	Thr	Pro	Thr	Leu	His	Glu	Tyr	Met	Leu	Asp	Leu
		115						120					125		
Gln	Pro	Glu	Thr	Thr	Asp	Leu	Tyr	Gly	Tyr	Gln	Gln	Leu	Asn	Asp	Ser
		130						135					140		
Ser	Glu	Glu	Glu	Asp	Glu	Ile	Asp	Gly	Pro	Ala	Gly	Gln	Ala	Glu	Pro
		145				150				155				160	
Asp	Arg	Ala	His	Tyr	Asn	Ile	Val	Thr	Phe	Cys	Cys	Lys	Cys	Asp	Ser
			165					170						175	
Thr	Leu	Arg	Leu	Cys	Val	Gln	Ser	Thr	His	Val	Asp	Ile	Arg	Thr	Leu
		180						185					190		
Glu	Asp	Leu	Leu	Met	Gly	Thr	Leu	Gly	Ile	Val	Cys	Pro	Ile	Cys	Ser
		195						200					205		
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		210					215						220		

<210> 9

<211> 879

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E6 from Human papilloma virus type 16)

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cacacagacg	gcaactggta	ctgggttcgac	aactcaggcg	aaatggctac	aggctggaag	180
aaaatcgctg	ataagtggta	ctatttcaac	gaagaagggtg	ccatgaagac	aggctgggtc	240
aagtacaagg	acacttggta	ctacttagac	gctaaagaag	gcgccatggt	atcaaagtcc	300
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gacaggccag	aattggccag	catgctggac	atggccatgt	ttcaggaccc	acaggagcga	420
cccagaaagt	taccacagtt	atgcacagag	ctgcaaacaa	ctatacatga	tataatatta	480
gaatgtgtgt	actgcaagca	acagttactg	cgacgtgagg	tatatgactt	tgcttttcgg	540
gatttatgca	tagtatatag	agatgggaat	ccatgatgctg	tatgtgataa	atgttttaag	600
ttttattcta	aaattagtga	gtatagacat	tattgttata	gtttgtatgg	aacaacatta	660
gaacagcaat	acaacaaacc	gttgtgtgat	ttgttaatta	ggtgtattaa	ctgtcaaaag	720
ccactgtgtc	ctgaagaaaa	gcaaagacat	ctgacaaaaa	agcaaagatt	ccataatata	780
aggggtcggt	ggaccggtcg	atgtatgtct	tggtgcagat	catcaagaac	acgtagagaa	840
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<220>

<223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E6 from Human papilloma virus type 16)

<400> 10

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 Phe Glu Lys Ile Asn Gly Thr Trp Tyr Tyr Phe Asp Ser Ser Gly Tyr
 20 25 30
 Met Leu Ala Asp Arg Trp Arg Lys His Thr Asp Gly Asn Trp Tyr Trp
 35 40 45
 Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp
 50 55 60
 Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val
 65 70 75 80
 Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met
 85 90 95
 Val Ser Asn Ala Phe Ile Gln Ser Ala Asp Gly Thr Gly Trp Tyr Tyr
 100 105 110
 Leu Lys Pro Asp Gly Thr Leu Ala Asp Arg Pro Glu Leu Ala Ser Met
 115 120 125
 Leu Asp Met Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu
 130 135 140
 Pro Gln Leu Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu
 145 150 155 160
 Glu Cys Val Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp
 165 170 175
 Phe Ala Phe Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr
 180 185 190
 Ala Val Cys Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr
 195 200 205
 Arg His Tyr Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr
 210 215 220
 Asn Lys Pro Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys
 225 230 235 240
 Pro Leu Cys Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg

	245		250		255										
Phe	His	Asn	Ile	Arg	Gly	Arg	Trp	Thr	Gly	Arg	Cys	Met	Ser	Cys	Cys
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Arg	Ser	Ser	Arg	Thr	Arg	Arg	Glu	Thr	Gln	Leu	Thr	Ser	Gly	His	His
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His	His	His	His												
	290														

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 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E7 from Human papilloma virus type 16)

<400> 11

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cacacagacg	gcaactggta	ctggttcgac	aactcaggcg	aaatggctac	aggctggaag	180
aaaatcgctg	ataagtggta	ctatttcaac	gaagaagggt	ccatgaagac	aggctgggtc	240
aagtacaagg	acacttggta	ctacttagac	gctaaagaag	gcgccatggt	atcaaagtcc	300
tttatccagt	cagcggacgg	aacaggctgg	tactacctca	aaccagacgg	aacactggca	360
gacaggccag	aattggccag	catgctggac	atggccatgc	atggagatac	acctacattg	420
catgaatata	tgttagattt	gcaaccagag	acaactgata	tctactgtta	tgagcaatta	480
aatgacagct	cagaggagga	ggatgaaata	gatggtcag	ctggacaagc	agaaccggac	540
agagccatt	acaatattgt	aaccttttgt	tgcaagtgtg	actctacgct	tcggttgtgc	600
gtacaaagca	cacacgtaga	cattcgtact	ttggaagacc	tgттаatggg	cacactagga	660
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 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E7 from Human papilloma virus type 16)

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 20 25 30
 Met Leu Ala Asp Arg Trp Arg Lys His Thr Asp Gly Asn Trp Tyr Trp
 35 40 45
 Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp
 50 55 60
 Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val
 65 70 75 80
 Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met
 85 90 95
 Val Ser Asn Ala Phe Ile Gln Ser Ala Asp Gly Thr Gly Trp Tyr Tyr
 100 105 110
 Leu Lys Pro Asp Gly Thr Leu Ala Asp Arg Pro Glu Leu Ala Ser Met
 115 120 125
 Leu Asp Met Ala Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met
 130 135 140
 Leu Asp Leu Gln Pro Glu Thr Thr Asp Leu Tyr Cys Tyr Glu Gln Leu
 145 150 155 160
 Asn Asp Ser Ser Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln
 165 170 175
 Ala Glu Pro Asp Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys
 180 185 190
 Cys Asp Ser Thr Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile
 195 200 205
 Arg Thr Leu Glu Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro
 210 215 220
 Ile Cys Ser Gln Lys Pro Thr Ser Gly His His His His His His
 225 230 235

<210> 13

<211> 1173

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (Clyta from Streptococcus
 pneumoniae and E6E7 fusion from Human papilloma
 virus type 16)

<400> 13

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aaaatcgctg ataagtggta ctatttcaac gaagaagggtg ccatgaagac aggctgggtc 240
aagtacaagg acacttggta ctacttagac gctaaagaag gcgccatggt atcaaagtc 300
tttatccagt cagcggacgg aacaggctgg tactacctca aaccagacgg aacactggca 360
gacaggccag aattggccag catgctggac atggccatgt ttcaggaccc acaggagcga 420
cccagaaagt taccacagtt atgcacagag ctgcaaaaca ctatacatga tataatatta 480
gaatgtgtgt actgcaagca acagttactg cgacgtgagg tatatgactt tgcttttcgg 540
gatttatgca tagtatatag agatgggaat ccatatgctg tatgtgataa atgtttaaag 600
ttttattcta aaattagtga gtatagacat tattgttata gtttgatgg aacaacatta 660
gaacagcaat acaacaaacc gttgtgtgat ttgttaatta ggtgtattaa ctgtcaaaag 720
ccactgtgtc ctgaagaaaa gcaaagacat ctggacaaaa agcaaagatt ccataatata 780
aggggtcggt ggaccggtcg atgtatgtct tgttgagat catcaagaac acgtagagaa 840
accagctga tgcattgaga tacacctaca ttgcatgaat atatgttaga tttgcaacca 900
gagacaactg atctctactg ttatgagcaa ttaaattgaca gctcagagga ggaggatgaa 960
atagatggtc cagctggaca agcagaaccg gacagagccc attacaatat tgtaaccttt 1020
tggtgcaagt gtgactctac gcttcggttg tgcgtacaaa gcacacacgt agacattcgt 1080
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<210> 14
<211> 390
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<220>
<223> Chimaeric protein (Clyta from Streptococcus
pneumoniae and E6E7 fusion from Human papilloma
virus type 16)

<400> 14
Met Lys Gly Gly Ile Val His Ser Asp Gly Ser Tyr Pro Lys Asp Lys
1 5 10 15
Phe Glu Lys Ile Asn Gly Thr Trp Tyr Tyr Phe Asp Ser Ser Gly Tyr
20 25 30
Met Leu Ala Asp Arg Trp Arg Lys His Thr Asp Gly Asn Trp Tyr Trp
35 40 45
Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp
50 55 60
Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val
65 70 75 80
Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met
85 90 95

Val Ser Asn Ala Phe Ile Gln Ser Ala Asp Gly Thr Gly Trp Tyr Tyr
 100 105 110
 Leu Lys Pro Asp Gly Thr Leu Ala Asp Arg Pro Glu Leu Ala Ser Met
 115 120 125
 Leu Asp Met Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu
 130 135 140
 Pro Gln Leu Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu
 145 150 155 160
 Glu Cys Val Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp
 165 170 175
 Phe Ala Phe Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr
 180 185 190
 Ala Val Cys Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr
 195 200 205
 Arg His Tyr Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr
 210 215 220
 Asn Lys Pro Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys
 225 230 235 240
 Pro Leu Cys Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg
 245 250 255
 Phe His Asn Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys
 260 265 270
 Arg Ser Ser Arg Thr Arg Arg Glu Thr Gln Leu Met His Gly Asp Thr
 275 280 285
 Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln Pro Glu Thr Thr Asp
 290 295 300
 Leu Tyr Cys Tyr Glu Gln Leu Asn Asp Ser Ser Glu Glu Glu Asp Glu
 305 310 315 320
 Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp Arg Ala His Tyr Asn
 325 330 335
 Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr Leu Arg Leu Cys Val
 340 345 350
 Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu Asp Leu Leu Met Gly
 355 360 365
 Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln Lys Pro Thr Ser Gly
 370 375 380
 His His His His His His
 385 390

<210> 15

<211> 684

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E7 from Human papilloma virus type
18)

<400> 15

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atggatccaa gcagccattc atcaaatatg gcgaataccc aaatgaaatc agacaaaatc      60
attattgctc accgtggtgc tagcggttat ttaccagagc atacgttaga atctaaagca      120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt      180
cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc      240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt      300
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggacc taaggcaaca      360
ttgcaagaca ttgtattgca tttagagccc caaaatgaaa ttccggttga ctttctatgt      420
cacgagcaat taagcgactc agaggaagaa aacgatgaaa tagatgaagt taatcatcaa      480
catttaccag cccgacgagc cgaaccacaa cgtcacacaa tgttgtgtat gtgttgtaag      540
tgtgaagcca gaattgagct agtagtagaa agctcagcag acgaccttcg agcattccag      600
cagctgtttc tgaacaccct gtcctttgtg tgtccgtggt gtgcatccca gcagactagt      660
ggccaccatc accatcacca ttaa                                         684
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<210> 16

<211> 227

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E7 from Human papilloma virus type
18)

<400> 16

Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
1 5 10 15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
20 25 30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
35 40 45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
50 55 60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
65 70 75 80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
85 90 95

Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
 100 105 110
 Ala Met His Gly Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu
 115 120 125
 Glu Pro Gln Asn Glu Ile Pro Val Asp Leu Leu Cys His Glu Gln Leu
 130 135 140
 Ser Asp Ser Glu Glu Glu Asn Asp Glu Ile Asp Glu Val Asn His Gln
 145 150 155 160
 His Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys
 165 170 175
 Met Cys Cys Lys Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser
 180 185 190
 Ala Asp Asp Leu Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser
 195 200 205
 Phe Val Cys Pro Trp Cys Ala Ser Gln Gln Thr Ser Gly His His His
 210 215 220
 His His His
 225

<210> 17

<211> 109

<212> PRT

<213> Escherichia coli

<400> 17

Met Ser Asp Lys Ile Ile His Leu Thr Asp Asp Ser Phe Asp Thr Asp
 1 5 10 15
 Val Leu Lys Ala Asp Gly Ala Ile Leu Val Asp Phe Trp Ala Glu Trp
 20 25 30
 Cys Gly Pro Cys Lys Met Ile Ala Pro Ile Leu Asp Glu Ile Ala Asp
 35 40 45
 Glu Tyr Gln Gly Lys Leu Thr Val Ala Lys Leu Asn Ile Asp Gln Asn
 50 55 60
 Pro Gly Thr Ala Pro Lys Tyr Gly Ile Arg Gly Ile Pro Thr Leu Leu
 65 70 75 80
 Leu Phe Lys Asn Gly Glu Val Ala Ala Thr Lys Val Gly Ala Leu Ser
 85 90 95
 Lys Gly Gln Leu Lys Glu Phe Leu Asp Ala Asn Leu Ala
 100 105

<210> 18

<211> 684

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza B and mutated E7 from Human papilloma virus type 18)

<400> 18

atggatccaa gcagccattc atcaaatatg gcgaataccc aaatgaaatc agacaaaatc 60
attattgctc accgtggtgc tagcggttat ttaccagagc atacgttaga atctaaagca 120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180
cgttttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaatc 240
ccacatcgtc atcgtaaaga tggcggttac tatgtcatcg actttacctt aaaagaaatt 300
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggacc taaggcaaca 360
ttgcaagaca ttgtattgca tttagagccc caaaatgaaa ttccggttga ctttctaggt 420
caccagcaat taagcgactc agaggaagaa aacgatgaaa tagatggagt taatcatcaa 480
catttaccag cccgacgagc cgaaccacaa cgtcacacaa tgttgtgtat gtgttgtaag 540
tgtgaagcca gaattgagct agtagtagaa agctcagcag acgaccttcg agcattccag 600
cagctgtttc tgaacaccct gtcctttgtg tgtccgtggt gtgcatccca gcagactagt 660
ggccaccatc accatcacca ttaa 684

<210> 19

<211> 227

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza B and mutated E7 from Human papilloma virus type 18)

<400> 19

Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
1 5 10 15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
20 25 30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
35 40 45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
50 55 60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
65 70 75 80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr

	85		90		95
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met					
100		105		110	
Ala Met His Gly Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu					
115		120		125	
Glu Pro Gln Asn Glu Ile Pro Val Asp Leu Leu Gly His Gln Gln Leu					
130		135		140	
Ser Asp Ser Glu Glu Glu Asn Asp Glu Ile Asp Gly Val Asn His Gln					
145		150		155	160
His Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys					
165		170		175	
Met Cys Cys Lys Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser					
180		185		190	
Ala Asp Asp Leu Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser					
195		200		205	
Phe Val Cys Pro Trp Cys Ala Ser Gln Gln Thr Ser Gly His His His					
210		215		220	
His His His					
225					

<210> 20
 <211> 837
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenza virus B and E6 from Human papilloma
 virus type 18)

<400> 20

atggatccaa gcagccattc atcaaatatg gcgaataccc aaatgaaatc agacaaaatc	60
attattgctc accgtggtgc tagcggttat ttaccaagagc atacgttaga atctaaagca	120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt	180
cgtttagtgg ttattcacga tcacttttta gatgggttga ctgatgttgc gaaaaaattc	240
ccacatcgtc atcgtaaaga tggccgttac tatgtgatcg actttacctt aaaagaaatt	300
caaagttag aaatgacaga aaactttgaa accatggcgc gctttgagga tccaacacgg	360
cgacctaca agctacctga tctgtgcacg gaactgaaca cttcactgca agacatagaa	420
ataacctgtg tatattgcaa gacagtattg gaacttacag aggtatttga atttgcattt	480
aaagatttat ttgtggtgta tagagacagt ataccgcatg ctgcatgcca taaatgtata	540
gatttttatt ctagaattag agaattaaga cattattcag actctgtgta tggagacaca	600
ttggaaaaac taactaacac tgggttatac aatttattaa taaggtgcct gcggtgccag	660
aaaccgttga atccagcaga aaaacttaga cactttaatg aaaaacgacg atttcacaac	720

atagctgggc actatagagg ccagtgccat tegtgtgca accgagcacg acaggaacga 780
ctccaacgac gcagagaaac acaagtaact agtggccacc atcaccatca ccattaa 837

<210> 21
<211> 278
<212> PRT
<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E6 from Human papilloma virus type
18)

<400> 21

Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
1 5 10 15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
20 25 30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
35 40 45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
50 55 60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
65 70 75 80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
85 90 95
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
100 105 110
Ala Arg Phe Glu Asp Pro Thr Arg Arg Pro Tyr Lys Leu Pro Asp Leu
115 120 125
Cys Thr Glu Leu Asn Thr Ser Leu Gln Asp Ile Glu Ile Thr Cys Val
130 135 140
Tyr Cys Lys Thr Val Leu Glu Leu Thr Glu Val Phe Glu Phe Ala Phe
145 150 155 160
Lys Asp Leu Phe Val Val Tyr Arg Asp Ser Ile Pro His Ala Ala Cys
165 170 175
His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg His Tyr
180 185 190
Ser Asp Ser Val Tyr Gly Asp Thr Leu Glu Lys Leu Thr Asn Thr Gly
195 200 205
Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu Asn
210 215 220
Pro Ala Glu Lys Leu Arg His Leu Asn Glu Lys Arg Arg Phe His Asn

225 230 235 240
 Ile Ala Gly His Tyr Arg Gly Gln Cys His Ser Cys Cys Asn Arg Ala
 245 250 255
 Arg Gln Glu Arg Leu Gln Arg Arg Arg Glu Thr Gln Val Thr Ser Gly
 260 265 270
 His His His His His His
 275

<210> 22

<211> 1152

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
 influenza B and E6E7 fusion from Human papilloma
 virus type 18)

<400> 22

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 attattgctc accgtggtgc tagcggttat ttaccagagc atacgttaga atctaaagca 120
 cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180
 cgttttagtg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaatc 240
 ccacatcgtc atcgtaaaga tggcggttac tatgtcatcg actttacctt aaaagaaatt 300
 caaagtttag aaatgacaga aaactttgaa accatggcgc gctttgagga tccaacacgg 360
 cgaccctaca agctacctga tctgtgcacg gaactgaaca cttcactgca agacatagaa 420
 ataacctgtg tatattgcaa gacagtattg gaacttacag aggtatttga atttgcattt 480
 aaagatttat ttgtggtgta tagagacagt ataccgcatg ctgcatgcca taaatgtata 540
 gatttttatt ctagaattag agaattaaga cattattcag actctgtgta tggagacaca 600
 ttggaaaaac taactaacac tgggttatac aatttattaa taagggtgcct gcggtgccag 660
 aaaccgttga atccagcaga aaaacttaga caccttaatg aaaaacgacg atttcacaac 720
 atagctgggc actatagagg ccagtgccat tctgtctgca accgagcacg acaggaacga 780
 ctccaacgac gcagagaaac acaagtaatg catggacctt aggcaacatt gcaagacatt 840
 gtattgcatt tagagcccca aaatgaaatt ccggttgacc ttctatgtca cgagcaatta 900
 agcgactcag aggaagaaaa cgatgaaata gatggagtta atcatcaaca tttaccagcc 960
 cgacgagccg aaccacaacg tcacacaatg ttgtgtatgt gttgtaagtg tgaagccaga 1020
 attgagctag tagtagaaag ctcagcagac gaccttcgag cattccagca gctgtttctg 1080
 aacaccctgt cctttgtgtg tccgtggtgt gcatccagc agactagtgg ccaccatcac 1140
 catcaccatt aa 1152

<210> 23

<211> 383

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza B and E6E7 fusion from Human papilloma virus type 18)

<400> 23

Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
1 5 10 15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
20 25 30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
35 40 45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
50 55 60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
65 70 75 80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
85 90 95
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
100 105 110
Ala Arg Phe Glu Asp Pro Thr Arg Arg Pro Tyr Lys Leu Pro Asp Leu
115 120 125
Cys Thr Glu Leu Asn Thr Ser Leu Gln Asp Ile Glu Ile Thr Cys Val
130 135 140
Tyr Cys Lys Thr Val Leu Glu Leu Thr Glu Val Phe Glu Phe Ala Phe
145 150 155 160
Lys Asp Leu Phe Val Val Tyr Arg Asp Ser Ile Pro His Ala Ala Cys
165 170 175
His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg His Tyr
180 185 190
Ser Asp Ser Val Tyr Gly Asp Thr Leu Glu Lys Leu Thr Asn Thr Gly
195 200 205
Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu Asn
210 215 220
Pro Ala Glu Lys Leu Arg His Leu Asn Glu Lys Arg Arg Phe His Asn
225 230 235 240
Ile Ala Gly His Tyr Arg Gly Gln Cys His Ser Cys Cys Asn Arg Ala
245 250 255
Arg Gln Glu Arg Leu Gln Arg Arg Arg Glu Thr Gln Val Met His Gly
260 265 270
Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu Glu Pro Gln Asn

275	280	285
Glu Ile Pro Val Asp Leu Leu Cys His Glu	Gln Leu Ser Asp Ser Glu	
290	295	300
Glu Glu Asn Asp Glu Ile Asp Gly Val Asn His Gln His Leu Pro Ala		
305	310	315
Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys Met Cys Cys Lys		
325	330	335
Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser Ala Asp Asp Leu		
340	345	350
Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser Phe Val Cys Pro		
355	360	365
Trp Cys Ala Ser Gln Gln Thr Ser Gly His His His His His His		
370	375	380

<210> 24
 <211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic

<400> 24
 tccatgacgt tcctgacgtt

20

<210> 25
 <211> 18
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic

<400> 25
 tctcccagcg tgcgccat

18

<210> 26
 <211> 30
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic

41

<400> 26
accgatgacg tcgccggtga cggcaccacg

30

<210> 27
<211> 6
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic

<400> 27
rrcgyy

6

<210> 28
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> E.coli

<400> 28
Thr Ser Gly His His His His His
1 5

31
concl'd.